VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF ISCHEMIC HEART DISEASE SUMMARY GUIDELINE CORE MODULE

INITIAL EVALUATION - CORE

KEY ELEMENTS

- Triage patients with possible acute MI or unstable angina for evaluation and treatment
- Initiate O_2, intravenous access and continuous ECG monitoring
- Institute advanced cardiac life support (ACLS), if indicated
- Obtain 12-lead electrocardiogram (ECG)
- Perform expedited history & physical to:
  - R/O alternative catastrophic diagnoses (Pericarditis, Pericardial tamponade, Thoracic aortic dissection, Pneumothorax, Pancreatitis, & Pulmonary embolus)
  - Elicit characteristics of MI
  - Contraindications to reperfusion therapy
- Administer the following:
  - Non-coated aspirin (160 to 325 mg).
  - Nitroglycerin (spray or tablet, followed by IV, if symptoms persist).
  - Beta-blockers in the absence of contraindications
  - Oral ACE-inhibitors in the absence of contraindications
  - Intravenous fractionated heparin if indicated
- Determine if patient meets criteria for emergent reperfusion therapy:
  - History of ischemia or infarction
  - ECG finding of LBBB or ongoing ST-segment elevation in 2 or more leads
- Ensure adequate analgesia (morphine, if needed)
- Obtain serum cardiac markers (troponin or CK-MD)
- Identify and treat other conditions that may exacerbate symptoms

When Stable - Non-Invasive Evaluation (Cardiac Stress Test)

Indications for Non-Invasive Evaluation:

- Establish or confirm a diagnosis of ischemic heart disease.
- Estimate prognosis in patients with known or suspected ischemic heart disease (IHD).
- Assess the effects of therapy.

Patients with contraindications to exercise testing should undergo pharmacologic stress testing with an imaging modality.

Establishing diagnoses:

- Is most useful if the pre-test probability of coronary artery disease (CAD) is Intermediate (10% to 90%).
- Should generally not be done in patients with very high or very low probabilities of CAD.

Variables useful in estimating prognosis include:

- Maximum workload achieved.
- Heart rate and blood pressure responses to exercise.
- Occurrence, timing, and degree of ST-segment depression.
- Occurrence and timing of ischemic symptoms.
- Size and number of stress-induced myocardial perfusion or wall motion abnormalities.

VA access to full guideline: http://www.oqp.med.va.gov/cpg/cpg.htm
DoD access to full guideline: http://www.QMO.amedd.army.mil

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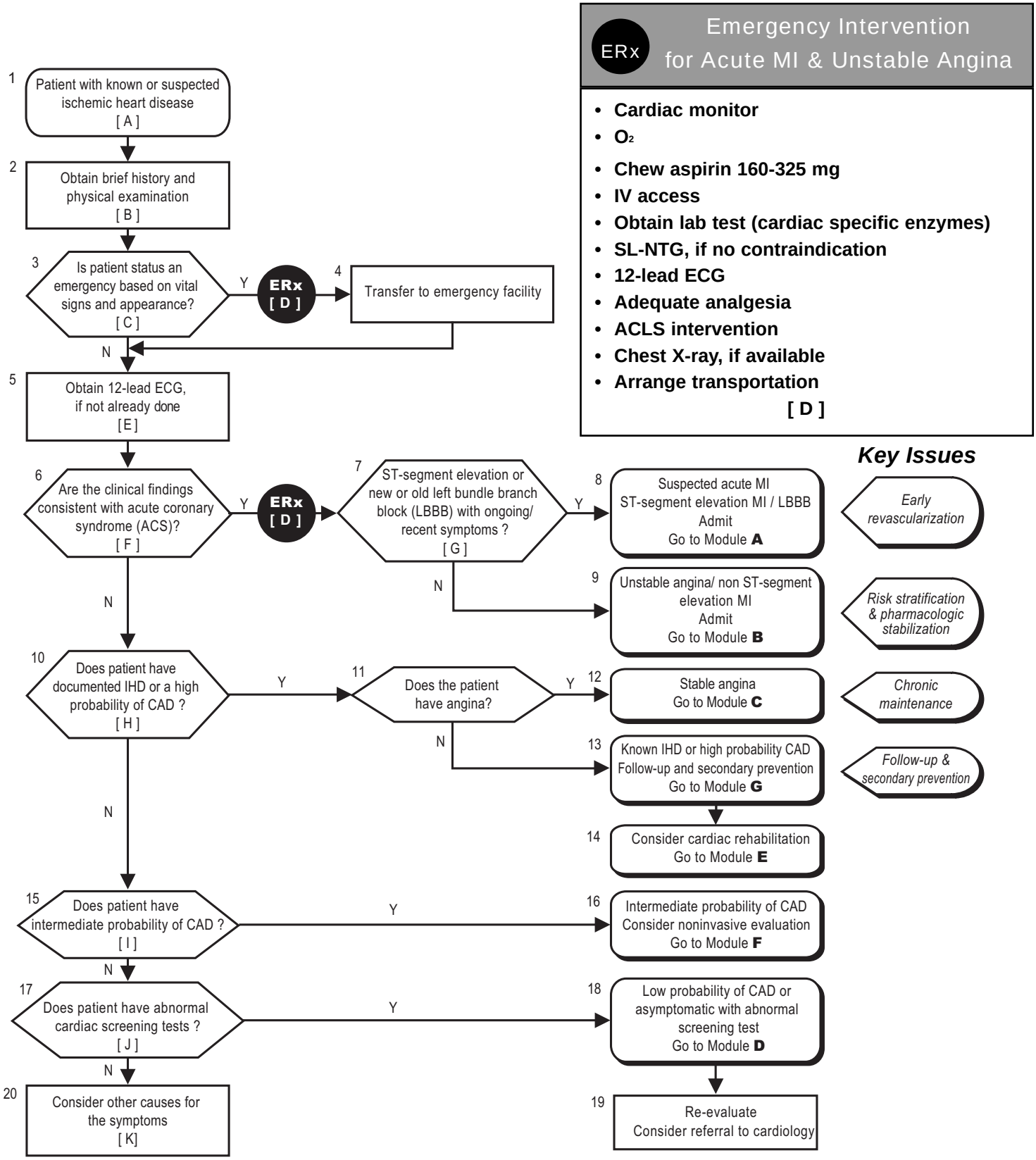
MANAGEMENT OF ISCHEMIC HEART DISEASE
CORE MODULE
INITIAL EVALUATION



INITIAL EVALUATION

Criteria for a Diagnosis of Ischemic Heart Disease (IHD)

- Prior MI and/or pathologic Q-waves on the resting electrocardiogram (ECG)
- Typical stable angina in males > age 50
- Cardiac stress test showing evidence of myocardial ischemia
- Left ventricular (LV) segmental wall motion abnormality by angiography or cardiac ultrasound
- Silent ischemia, defined as reversible ST-segment depression by ambulatory ECG monitoring
- Significant obstructive coronary artery disease (CAD) by angiography
- Prior coronary revascularization (percutaneous coronary intervention (PCI) or coronary artery bypass graft surgery (CABG))

IHD may be suspected in patients who do not meet one of the above criteria, if they have symptoms suggestive of myocardial ischemia or infarction. Although chest pain is the classic presentation for stable and unstable angina and for acute myocardial infarction (AMI), other symptoms such as chest heaviness; arm, neck, jaw, elbow, or wrist pain or discomfort; breathlessness; nausea; palpitations; syncope; change in exercise tolerance; or simply not feeling quite right can all represent symptoms of IHD. Furthermore, patients may present with non-cardiac chest pain (e.g., peptic symptoms) and undergo an evaluation that reveals significant CAD for which they are asymptomatic.

Symptoms That May Represent an Acute Coronary Syndrome

- Chest pain, discomfort, pressure, tightness, or heaviness (i.e., at least a one-class increase Canadian Cardiovascular Society Classification (CCSC)).
- Radiating pain to the neck, jaw, arms, shoulders, or upper back
- Unexplained or persistent shortness of breath
- Unexplained epigastric pain
- Unexplained indigestion, nausea, or vomiting
- Unexplained diaphoresis
- Unexplained weakness, dizziness, or loss of consciousness

The ACC/AHA UA - NSTEMI (2000) describes the different classes of the CCS classifications as follows:

Class I:	**Angina only with *strenuous* exertion** Ordinary physical activity, such as walking or climbing stairs, does not cause angina. —Angina occurs with strenuous, rapid, or prolonged exertion at work or recreation.
Class II:	**Angina with *moderate* exertion** Slight limitation of ordinary activity. —Angina occurs on walking or climbing stairs rapidly; walking uphill; walking or stair climbing after meals; in cold, in wind, or under emotional stress; or only during the few hours after awakening. Angina occurs on walking more than two blocks on the level and climbing more one flight of ordinary stairs at a normal pace and under normal conditions.
Class III:	**Angina with *minimal* exertion or ordinary activity** Marked limitations of ordinary physical activity. —Angina occurs on walking 1 to 2 blocks on the level and climbing 1 flight of stairs under normal conditions and at a normal pace.
Class IV:	**Angina *at rest* or with *any* physical activity** Inability to carry on any physical activity without discomfort. —Anginal symptoms may be present at rest.

EMERGENCY INTERVENTIONS FOR PATIENTS WITH POSSIBLE ACS

Rapidly triage patients with possible AMI, unstable angina, or unstable hemodynamic status from other causes to a high-acuity setting for rapid diagnostic evaluation and treatment.

Emergency Status

A patient presenting with chest pain/discomfort in the emergency department should be considered an emergency, if the evaluation reveals:

Patient's vital signs (including one or more of the following):

- Pulse ≥110 or ≤55 beats per minute
- Systolic blood pressure ≥200 or ≤90 mm Hg
- Diastolic blood pressure ≥110 mm Hg
- Respiratory rate >24 or <10 inspirations per minute
- Oxygen saturation <90 percent
- Irregular pulse
- Conductive disturbances or tachyarrhythmias

AND/OR

Patient's Appearance (including one or more of the following):

- Is unconscious or lethargic and/or confused
- Has severe respiratory distress or respirations appear labored
- Appears cyanotic, pale, or gray
- Appears diaphoretic
- Is in extreme pain or exhibits visible distress

Sudden cardiac death can occur early in any ischemic syndrome. The goals of rapid treatment of MI are to preserve as much myocardium as possible, avoid later complications of heart failure and dysrhythmias, and decrease risk of death.

Cardiac monitor

Patients with a possible ACS should be placed on continuous electrocardiograph monitoring as soon as possible. Potentially lethal ventricular arrhythmias can occur within seconds to minutes of the onset of coronary ischemia, and monitoring will allow their immediate detection and treatment.

Oxygen (O_2)

Supplemental oxygen should be administered on initial presentation and during the first 2 to 3 hours and/or continued to maintain oxygen saturations of at least 90%. Because oxygen can actually cause systemic vasoconstriction, continued administration should be reassessed for uncomplicated patients. CO_2 retention is not usually a concern with low flow nasal oxygen, even in patients with severe chronic obstructive pulmonary disease (COPD).

Chew aspirin

- All patients should chew non-coated aspirin, 160 mg to 325 mg, within 10 minutes of presentation.
- Patients should be given aspirin, even if they are receiving anticoagulation (e.g., warfarin) or antiplatelet (e.g., aspirin or clopidogrel) at the time of presentation.
- If a patient is unable to take aspirin by mouth because of nausea, vomiting, or other gastrointestinal disorders, 325 mg may be given as a suppository.
- Contraindications to aspirin include a documented allergy to salicylates, active bleeding or active peptic ulcer disease.
- Patients who have an allergy to aspirin or gastrointestinal intolerance and no contraindication to antiplatelet therapy may be given clopidogrel, ticlopidine, or dypyridamole.

Intravenous (IV) Access

Intravenous access for the delivery of fluids and drugs should be obtained, with both antecubital veins used if possible for multiple infusions, especially if thrombolytic therapy is being considered. While the IV is being started, blood samples for cardiac enzymes/markers (troponin - preferred, CK, CK-MB acceptable), lipid profile, CBC, electrolytes, creatinine, etc., can be obtained. Immediate treatment of ACS should not depend on waiting for these laboratory results.

Sublingual NTG

- Patients presenting with symptoms consistent with a MI and ECG changes suggestive of an ST-Segment-MI (STEMI), may be given nitroglycerin 0.3 mg to 0.4 mg sublingually during the initial evaluation. Vasospastic angina may respond to sublingual nitroglycerin. The administration of sublingual nitroglycerin should not delay reperfusion therapy.
- Intravenous nitroglycerin should be considered for 24 to 48 hours in patients with a large, anterior wall MI,

persistent ischemia, CHF, or hypertension.
- Nitrates should be avoided in patients with evidence for a right ventricular infarction.
- Contraindications to nitrates include the use of sildenafil within 24 hours of presentation, hypotension (systolic blood pressure <90 mm Hg), or significant bradycardia (i.e., heart rate <50 bpm).

Adequate analgesia

Adequate analgesia should be given promptly; IV morphine is effective, decreases the often excess sympathetic tone, and is a pulmonary vasodilator. Some patients may require a large dose. The patient should be monitored for hypotension and respiratory depression, but these are less likely in the anxious, hyperadrenergic patient who is kept supine.

ACLS interventions

ACLS interventions should be applied as indicated.

Chest X-ray

A chest X-ray should be obtained—particularly if there is concern about aortic dissection; however, treatment of hypotension, low cardiac output, arrhythmias, etc., usually have higher priority.

Transportation

In some settings in the DoD or the VA system, the patient will need to be urgently transported to a setting where an appropriate level of monitoring, evaluation, and treatment is available.

ASSESSMENT

Chief Complaint

The clinical examination is the most important step in the evaluation of the patient with chest pain.

Medical History

The triage nurse or physician should take a brief, targeted, initial history with an assessment of current or past history of the following (this brief history must not delay entry into the Advanced Cardiac Life Support (ACLS) protocol):

- CABG, angioplasty, angina on effort, prior MI, or other evidence of CAD, such as an abnormal stress test or coronary arteriography.
- Nitroglycerin (NTG) use to relieve chest discomfort
- Risk factors, including smoking, hyperlipidemia, hypertension, diabetes mellitus, family history, and cocaine use

Physical Examination

The major objectives of the physical examination are to identify precipitating causes of myocardial ischemia (e.g., hypertension and thyrotoxicosis), the presence of comorbid conditions, and the hemodynamic status. Several important aspects of the examination are listed below:

- Vital signs (i.e., blood pressure in both arms, heart rate, respiratory rate, and temperature)
- Evidence of heart failure (i.e., S3 gallop, rales, and elevated jugular venous pressure)
- Evidence of significant mitral or aortic valvular disease
- Evidence of extra-cardiac vascular disease (i.e., bruits or diminished pulses)
- Evidence of non-coronary causes of chest pain (i.e., pericardial or pleural rub)

DIAGNOSIS

12-Lead ECG

A 12-lead ECG is an essential component of the evaluation of the patient with known or suspected IHD. For patients with ongoing symptoms, an urgent ECG should be obtained in the first 10 minutes of the initial evaluation. For patients without ongoing symptoms, an elective 12-lead ECG should be obtained if no prior ECG performed within the past year is available for review, or if there has been an interval worsening of the patient's symptoms.

Diagnosis of Acute Coronary Syndrome

The decision process can be achieved using information derived from a brief, targeted history and physical examination; a 12-lead ECG; and a lab test for cardiac markers. The following two interrelated questions form the basis of the decision process:

1. What is the likelihood (i.e., low, intermediate, or high) that the patient's symptoms are due to myocardial ischemia or infarction?
2. Do the clinical findings satisfy criteria for an ACS?

Diagnosis of ACS: A diagnosis of ACS may be made if at least *one major criterion* or at *least one minor criterion from both columns I and II* is present.

Major Criteria *A diagnosis of an ACS can be made if one or more of the following major criteria is present*	**Minor Criteria** *In the absence of a major criterion, a diagnosis of ACS requires the presence of at least one item from both columns*	
	I	**II**
• ST-elevation [(a)] or LBBB in the setting of recent (<24 hours) or ongoing angina • New, or presumably new, ST-segment depression (≥0.05 mV) or T-wave inversion (≥0. 2 mV) with rest symptoms • Elevated serum markers of myocardial damage (i.e., troponin I, troponin T, and CK-MB)	• Prolonged (i.e., >20 minutes) chest, arm, or neck discomfort • New onset chest, arm or neck discomfort during minimal exertion or ordinary activity (CCS class III or IV) • Previously documented chest, arm, or neck discomfort which has become distinctly more frequent, longer in duration, or lower in precipitating threshold (i.e., increased by ≥1 CCS class to at least CCS III severity)	• Typical or atypical angina [(b)] • Male age > 40 or female age >60 [(c)] • Known CAD • Heart failure, hypotension, or transient mitral regurgitation by examination • Diabetes • Documented extra-cardiac vascular disease • Pathologic Q-waves on ECG • Abnormal ST-segment or T-wave abnormalities not known to be new

[(a)] ST elevation ≥ 0.2 mV at the J-point in two or more contiguous chest leads V_1, V_2, or V_3; or ≥ 0.1 mV in all other leads. Contiguity in the limb leads (frontal plane) is defined by the lead sequence: aVL, I, inverted aVR, II, aVF, III. (ESC/ACC, 2000)

[(b)] Use the following definitions to determine the likelihood that the presenting symptoms are angina:

Typical (definite) angina	IF all three of the primary symptom characteristics are present: • Substernal chest or arm discomfort with a *characteristic* quality and duration • Provoked by exertion or emotional stress • Relieved by rest or nitro-glycerin
Atypical (probable) angina	IF any two of the above primary three symptom characteristics are present
Probably non-cardiac chest pain	IF provocation by exertion or emotional distress or relief by rest or nitroglycerin are present and one or more symptom characteristics suggesting non-cardiac pain are present
Definitely non-cardiac chest pain	IF none of the primary symptom characteristics are present and one or more symptom characteristics suggesting non-cardiac pain are present

[(c)] These age and gender characteristics define a probability of CAD ≥ 10 percent in symptomatic patients.

Symptom *characteristics* that suggest non-cardiac pain include the following:

- Pleuritic pain (i.e., sharp or knife-like pain brought on by respiratory movements or cough)
- Primary or sole location of discomfort in the middle or lower abdominal regions
- Pain that may be localized at the tip of one finger, particularly over costochondral junctions or the LV apex
- Pain reproduced with movement or palpation of the chest wall or arms
- Constant pain that lasts for many hours
- Very brief episodes of pain that last a few seconds or less
- Pain that radiates into the lower extremities

Canadian Cardiovascular Society Classification of Angina	
Class I	Angina only with *strenuous* exertion
Class II	Angina with *moderate* exertion
Class III	Angina with *minimal* exertion or ordinary activity
Class IV	Angina *at rest* or with *any* physical activity

Acute Myocardial Infarction (ST-Segment Elevation or New or Old LBBB With Ongoing/Recent Symptoms)

Patients with ST-segment elevation or new or old left bundle branch block (LBBB) and symptoms consistent with myocardial ischemia or infarction should be considered for emergent reperfusion therapy.

- Electrocardiographic criterion for ST-segment elevation MI is "new or presumed new ST-segment elevation at the J point in two or more contiguous leads with the cut-off points ≥0.2 mV in leads V_1, V_2, or V_3 and ≥0.1 mV in other leads (contiguity in the frontal plane is defined by the lead sequence aVL, I, invert aVR, II, aVF, III).
- Patients presenting with symptoms and ST-segment depression, on the other hand, have not been shown to benefit from the thrombolytics, though direct percutaneous revascularization may be of benefit in patients with a high-risk presentation and ongoing symptoms unrelieved by medical therapy.
- Patients presenting with LBBB and ongoing symptoms suggestive of an AMI should be referred for emergent reperfusion therapy because LBBB morphology on ECG obscures ST-segment and Q-wave interpretation and because of the association of LBBB with underlying CAD. More difficult is the treatment of patients presenting with resolved symptoms and LBBB on ECG. Clinical judgment will be required to determine whether such patients should be referred for emergent revascularization.

Unstable Angina (UA) and Non-ST-Elevation Myocardial Infarction (NSTEMI)

Patients presenting with UA/NSTEMI are considered to be a subset of ACS.

UA is commonly considered to have three presentations: (1) rest angina; (2) new onset of severe angina, defined as at least Class III severity by the Canadian Cardiovascular Society (CCS) classification; and (3) increasing angina to at least CCS Class III severity. The hallmark of NSTEMI is an elevation of markers of myocardial injury in the blood stream (e.g., troponin I, troponin T, or CK-MB). Because the pathogenesis and treatment of UA and NSTEMI are similar, they are considered together here.

The distinction of ST-segment MI (STEMI) or LBBB MI from UA and NSTEMI is important, because immediate reperfusion, with either primary angioplasty or thrombolytic agents, has been shown to reduce mortality in patients with STEMI or LBBB MI, whereas the use of thrombolytics may be potentially harmful in UA and NSTEMI.

Stable Angina

For patients who do not meet criteria for an ACS, identify the patient who has a known CAD and/or stable symptoms and a high likelihood of CAD.

Known CAD

- Prior coronary revascularization procedure (bypass surgery or angioplasty)
- Prior documented myocardial infarction
- Prior coronary angiogram demonstrating an obstructive CAD (>50 percent left main stenosis and/or >70 percent stenosis of a major epicardial artery)
- Prior non-invasive test indicating a high probability of CAD:
  - —Pathologic Q-waves (>0.04 seconds duration and >25 percent of the height of the R-wave) on a standard resting ECG (except leads III, aVR, and V1)
  - —Greater than 1mm ST-segment depression on exercise electrocardiography (this finding has decreased specificity in women, when it is observed only at high workloads, or limited to lead III.)
  - —Medium- or large-sized fixed or reversible defect on myocardial perfusion imaging (e.g., thallium)
  - —Segmental wall motion abnormalities by cardiac ultrasound examination or LV angiography
  - —Reversible, segmental wall motion abnormalities on stress echocardiography

High Probability of CAD

It should be reemphasized that the following table *applies only to patients who do not have ACS.* The likelihood that a patient's symptoms are due to CAD is estimated using only age, gender, and the character of the symptoms. The ECG and serum markers of myocardial necrosis are not considered.

Pretest Probability of CAD by Age, Gender, and Symptoms (a)					
Age	**Gender**	**Typical/Definite Angina Pectoris[b]**	**Atypical/Probable Angina Pectoris[b]**	**Non-cardiac Chest Pain[b]**	**Asymptomatic**
30–39	Men	Intermediate	Intermediate	Low	Low
	Women	Intermediate	Intermediate	Low	Low
40–49	Men	Intermediate	Intermediate	Intermediate	Low
	Women	Intermediate	Intermediate	Low	Low
50–59	Men	**High**	Intermediate	Intermediate	Low
	Women	Intermediate	Intermediate	Low	Low
60–69	Men	**High**	Intermediate	Intermediate	Low
	Women	Intermediate	Intermediate	Intermediate	Low

[a] No data exist for patients less than 30 years or greater than 69 years, but it can be assumed that prevalence of CAD increases with age. In a few cases, patients with ages at the extremes of the decades listed may have probabilities slightly outside the high or low range. "High" indicates >90 percent, "intermediate" indicates 10 percent to 90 percent, and "low" indicates <10 percent probability of CAD.

[b] See Annotation F, Table 5, footnote (b) for the definitions used in the classification of symptoms into typical/definite angina, atypical/probable angina, and non-anginal chest pain or page 7 of this document.

ASYMPTOMATIC PATIENT

Patient with Abnormal Cardiac Screening Tests

In general, asymptomatic patients with normal ECGs do not warrant further evaluation for IHD. However, patients may seek guidance from their primary physician regarding abnormalities in cardiac tests performed elsewhere. Non-invasive testing for CAD is being performed with increasing regularity in asymptomatic individuals—both because of the concern of an association between subclinical ("silent") CAD and an increased risk of coronary events, and of advances in techniques used to detect occult CAD. The testing may be done as part of a routine physical examination, an exercise program, a preoperative evaluation, an evaluation performed for peripheral or cerebral vascular disease, or by patient request.

Consider Other Causes for the Symptoms

Consider both cardiovascular (non-ischemic) and non-cardiovascular causes of the patient's chest discomfort

Nonischemic Cardiovascular	Pulmonary	Gastrointestinal	Chest Wall	Psychiatric
• Aortic dissection • Pericarditis	• Pulmonary embolus • Pneumothorax • Pneumonia • Pleuritis	• Esophageal —Esophagitis —Spasm —Reflux • Biliary —Colic —Cholecystitis —Choledo-cholithiasis —Cholangitis • Peptic ulcer • Pancreatitis	• Costochondritis • Fibrositis • Rib Fracture • Sternoclavicular arthritis • Herpes zoster (before the rash)	• Anxiety disorder —Hyperventilation —Panic disorder —Primary anxiety • Affective disorders (e.g., depression) • Somatoform disorders • Thought disorders (e.g., fixed delusion)